Remarks

The claims have been rejected as being unpatentable over (a) US 6,943,136 (herein "Kwon") in combination with newly cited US 6,899,928 (herein "Groves"), or (b) US 5,248,649 (herein "Nagaishi") or newly cited US 6,177,135 (herein "Himtermaier") in combination with Groves.

Part (a) – Kwon with Groves

Kwon discloses a method of improving superconducting properties of selected (Rare Earth)$Ba_2Cu_3O_7$ layers by adding a thin buffer layer (column 4, lines 37+). The rate formation of the thin films or layers can be varied from about 0.01 nm/s to about 20 nm/s (column 4, lines 25+). Kwon, however, has not been found to include even a hint that a thick superconducting layer of good quality (high T_c and high current density) could be deposited with a high growth rate after a thin buffer layer (of the same or similar material composition as the thick layer) has been grown very slowly on the substrate.

Newly applied Groves describes a process which allows a deposition of different buffer layers between a polycrystalline metal substrate and a YBCO superconducting layer. After the formation of a thin nucleation layer (about 5 nm) on the substrate, a MgO layer is deposited using a DIBAD process (dual ion beam assisted deposition) (cf. column 4, line 24). On the MgO layer one or two thin buffer layers (about 20 nm) of yttrium or YSZ (yttrium stabilized zirconium oxide) are slowly formed (0.05 nrn/s) using a PLD process (pulse layer deposition). On this or these buffer layer(s) the YBCO layer is rather rapidly (21 nm/s) deposited using again PLD (cf. column 6, line 11).

The Examiner acknowledges that Kwon "fails to teach changing the rate of formation from low to high". In respect of this deficiency of Kwon as a teaching reference, the Examiner contends that it would have been obvious for one skilled in the art "to have modified the [Kwon] process by slowing down deposition of the superconducting buffer layer as evidenced by [Groves] with the expectation of achieving a higher quality buffer film which would in turn produce a higher quality superconducting film thereon based on the crystallographic structure of the buffer film being continued throughout the superconducting layer".

The Examiner, however, has not taken into account the fact that Kwon describes a homo-epitaxy process whereas Groves discloses a hetero-epitaxy process for the formation of an adaptation structure between the superconducting YBCO and the oriented MgO buffer layer. The adaptation of the crystallographic structure of the

YBCO layer to the oriented MgO buffer layer is achieved by different layers of different materials, and not by a slowly deposited YBCO buffer layer.

The growth rates for the buffer layers in given in Groves are process-related (reactive sputtering). Deposition rates are parameters strongly depending on individual materials which can not simply be transferred to other material systems since the formation of a crystallographic structure depends strongly on its chemical composition, the masses of the involved elements, diffusion lengths and temperatures. The Examiner's attempt to transfer the use of different deposition rates for different materials to the deposition of identical or similar materials is driven by impermissible hindsight.

Consequently, Groves provides no reasonable basis for the skilled person to modify Kwon in a manner giving rise to the subject matter of the claims. Therefore, the rejection based on Kwon and Groves should be withdrawn.

<u>Part (b) – Nagaishi with Groves</u>

Nagaishi discloses a method for preparing a high-quality thin superconducting film of a Bi-Sr-Ca-Cu-O. According to Nagaishi the quality of this type of super-conducting layer can be improved by reducing its growth rate (0.05 nm/s) (column 2, lines 55+).

The Examiner concedes that Nagaishi fails to teach the claimed growth rates, but fails to acknowledge other significant deficiencies of Nagaishi. Nagaishi, for instance, has not been found to include even a hint that a second layer could be grown on the slowly grown first layer with a higher deposition rate and still yield a good quality. There has not been found even an indication that a second layer is foreseen in Nagaishi.

Additionally, the material composition of the superconducting film in Nagaishi is different from that set forth in the claims.

The addition of Groves does not overcome these fundamental deficiencies of Hagaishi. Groves provides no reasonable basis for the skilled person to modify Nagaishi in a manner giving rise to the subject matter of the claims. Therefore, the rejection based on Kwon and Groves should be withdrawn.

Part (b) – Himtermaier with Groves

Newly cited Himtermaier describes a CVD process (chemical vapor deposition) to deposit a ferroelectric film on a substrate. The film comprises of SBT (strontium bismuth tantalate, $SrBi_2TaO_9$) (cf. column 1, line 55) and is being used of nonvolatile memories (cf. column 1, line 35). Himtermaier explains that a CVD process can be carried out under different conditions. It may be helpful to have a nucleation control in the beginning, even if this decreases the growth rate. After the nucleation step, the conditions are changed for a high growth rate (cf. column 10, line 23).

Himtermaier, however, has not been found to deal at all with a superconducting material. Consequently, there is lacking any reasonable basis for the skilled person to look to Groves on how one might improve the process of Himtermaier. There simply would be no reasonable expectation that modifying Himtermaier as contended by the Examiner would result in a high quality superconducting layer, since any application of Groves to Himtermaier, even if there was some basis for doing so, would not magically result in a superconducting material.

Conclusion

In view of the foregoing, request is made for timely issuance of a notice of allowance.

Respectfully submitted,

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